TWO AND THREE – DIMENSIONAL VISUALIZATION & ASSESSMENT OF COORDINATES AND ELEVATIONS PRECISION DERIVED FROM UAV's IMAGES

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Objectives & Aims

- This project will determine whether GIS applications & high precision survey graded RTK GPS, Total station combine with UAV's techniques of field data collection will yield a high quality data for spatial analysis and mapping purposes.

- It can also project the capabilities and potential uses of each equipment, techniques and method of GIS data collection.

- 2D and 3D Map production
  - Low & Medium Terrain – Vaturara Playing field
  - High Terrain – 12 Hall New construction

Data Acquisition

Study Area

12 Hall New Construction

- **High Terrain**

Vaturara Playing Field

- **Low & Medium Terrain**

Equipments & Tools

R2 Rover (Antenna)

M3 Total Station

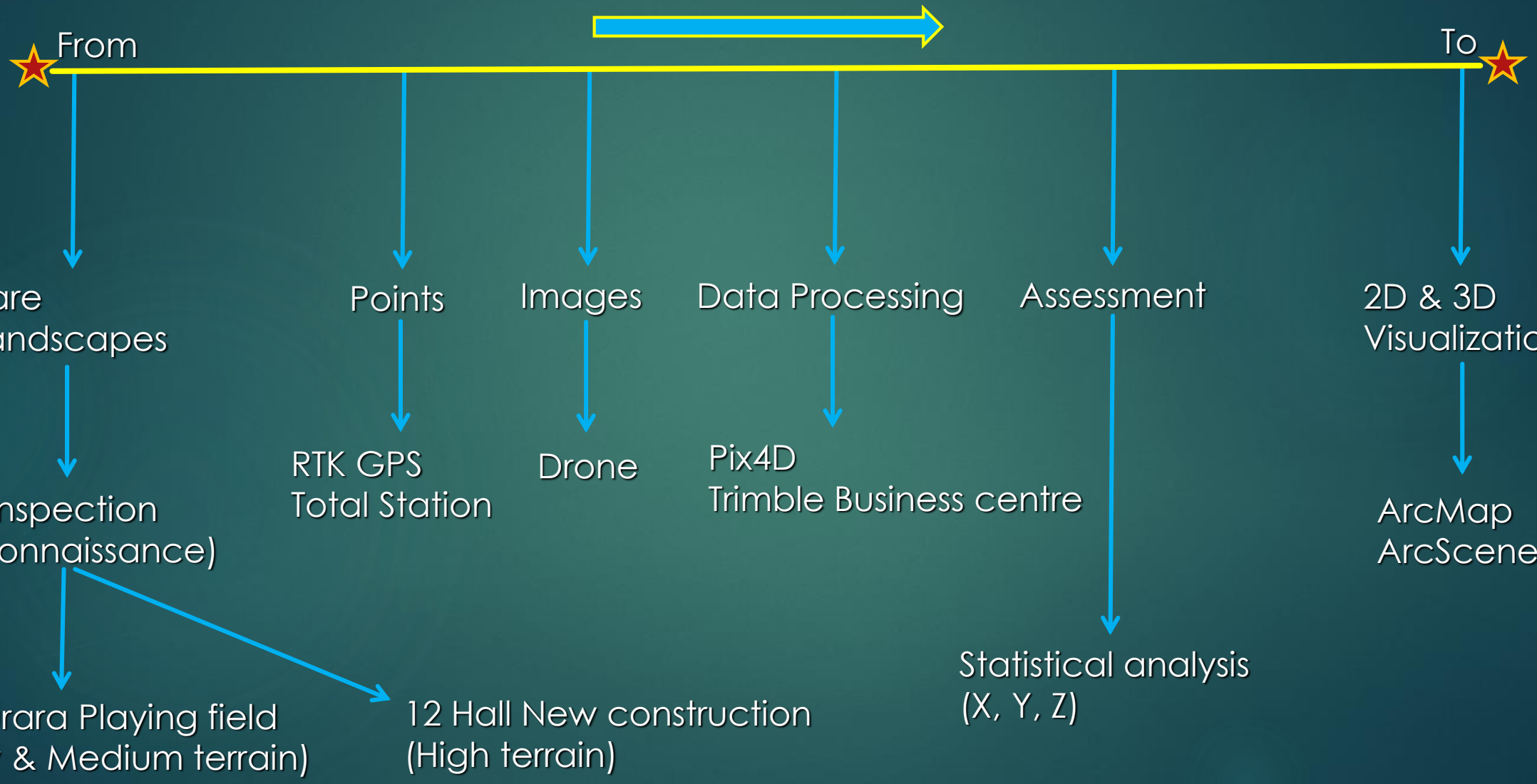
Drone DJI Phantom 4

R8 Base station (GPS)

GPS Controller

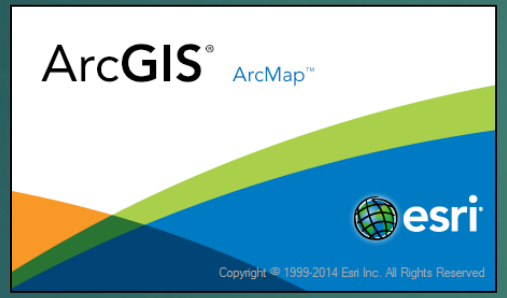
Tripod (2 X)

Methodology



Software

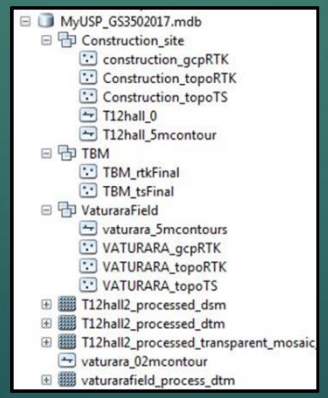
ESRI ArcGIS



Mapping
GIS data management

PIX4D

Drone Image processing



GPS & Total Station Download

Data Processing

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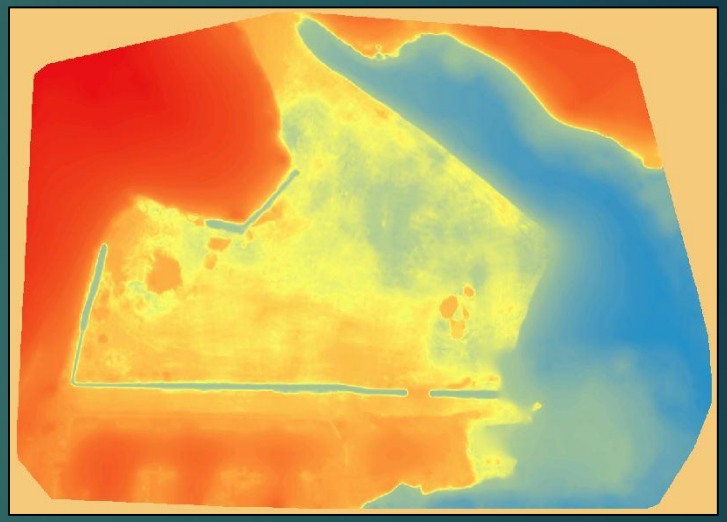
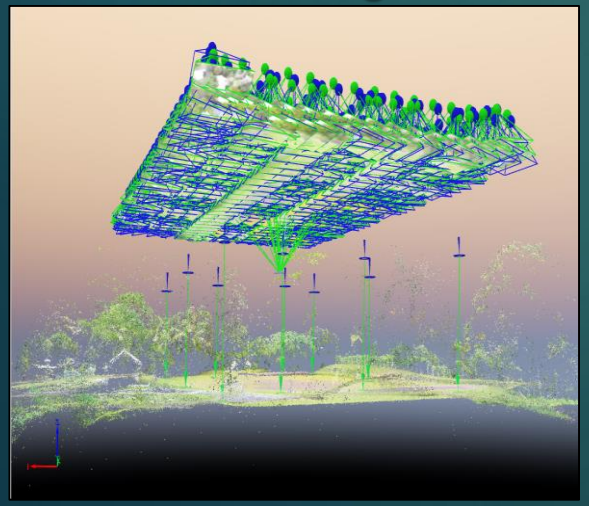
Initial Processing

Orthomosaic

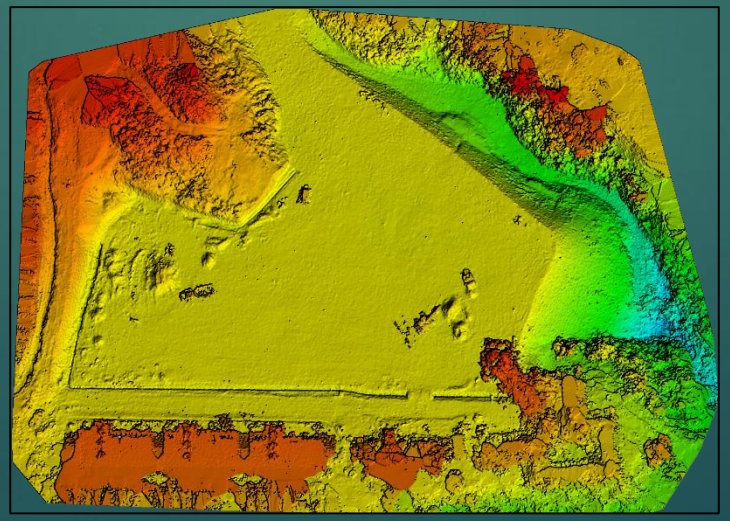
DEM/DTM



Geo-referencing to GCP's



DSM



Results & Discussions

Accuracy and Precision

Statistical analysis

Coordinates assessment Drone vs. RTK vs. Total station

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Original Temporary bench marks – RTK vs Total Station

TBM RTK				TBM TS			
Station Name	Easting	Northing	Elevation	Station Name	Easting	Northing	Elevation
ORIGIN	1967537.452	3872903.188	20.55	TBM0_center	1967364.423	3872884.243	23.342
TBM1	1967347.248	3872938.607	28.924	TBM1	1967347.248	3872938.607	28.924
TBM2	1967424.511	3872862.605	23.358	TBM2	1967424.511	3872862.605	23.358
TBM3	1967306.859	3872862.001	23.68	TBM3	1967306.859	3872862.001	23.68
TBM4	1967270.485	3872563.002	27.769	TBM4	1967270.485	3872563.002	27.769
TBM5	1967287.285	3872538.102	27.724	TBM5	1967287.285	3872538.102	27.724
TBM6	1967304.45	3872504.15	27.302	TBM6	1967304.45	3872504.15	27.302

Comparing X, Y, Z

Station Name	Easting Diff	Northing Diff	Elevation Diff
TBM1	0	0	0
TBM2	0	0	0
TBM3	0	0	0
TBM4	0	0	0
TBM5	0	0	0
TBM6	0	0	0

VRTK GCP's			
Station Name	Easting	Northing	Elevation
GCP001	1967270.391	3872549.953	25.694
GCP002	1967210.987	3872530.292	25.967
GCP003	1967227.458	3872486.565	25.691
GCP004	1967243.214	3872438.917	25.242
GCP005	1967301.824	3872454.376	24.456
GCP006	1967286.079	3872502.117	25.208
GCP007	1967281.141	3872462.779	25.363
GCP008	1967255.751	3872456.264	25.667
GCP009	1967235.016	3872524.75	25.975
GCP010	1967257.157	3872532.619	25.888
GCP011chk	1967258.039	3872494.574	25.879

12HRTK GCP's			
Station Name	Easting	Northing	Elevation
GCP1	1967382.691	3872928.382	23.164
GCP2	1967381.022	3872869.092	23.563
GCP7	1967420.59	3872953.606	17.593
GCP10	1967291.852	3872959.709	35.702
GCP11	1967298.911	3872863.735	23.775
GCP12	1967424.097	3872859.438	23.228
GCP13	1967433.501	3872919.671	23.236
GCP14	1967393.75	3872954.743	23.377
GCP15	1967464.534	3872966.89	26.9
GCP16	1967360.988	3872950.667	24.231

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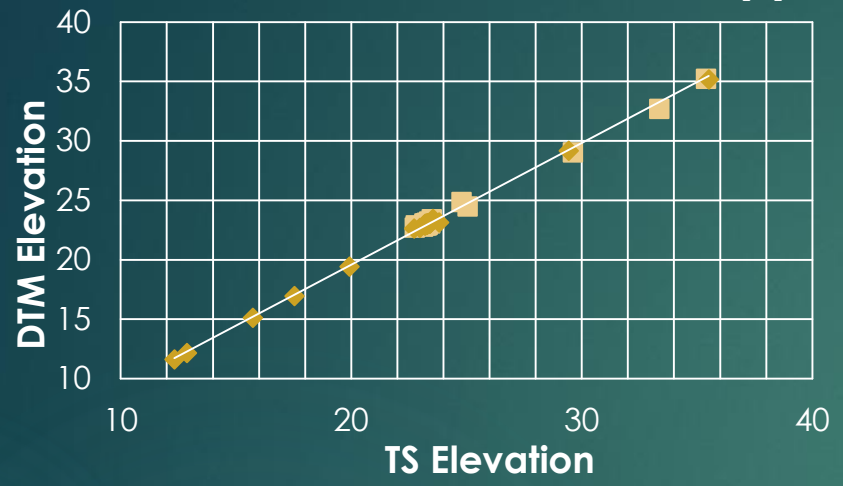
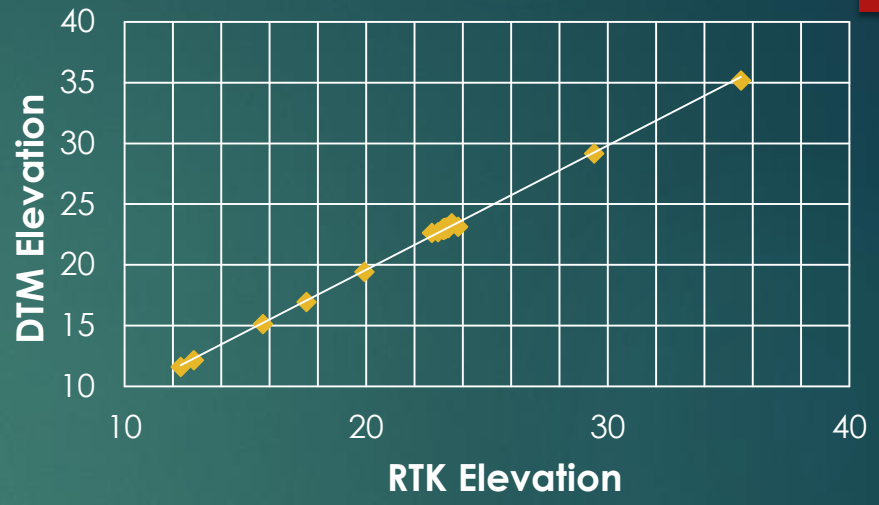
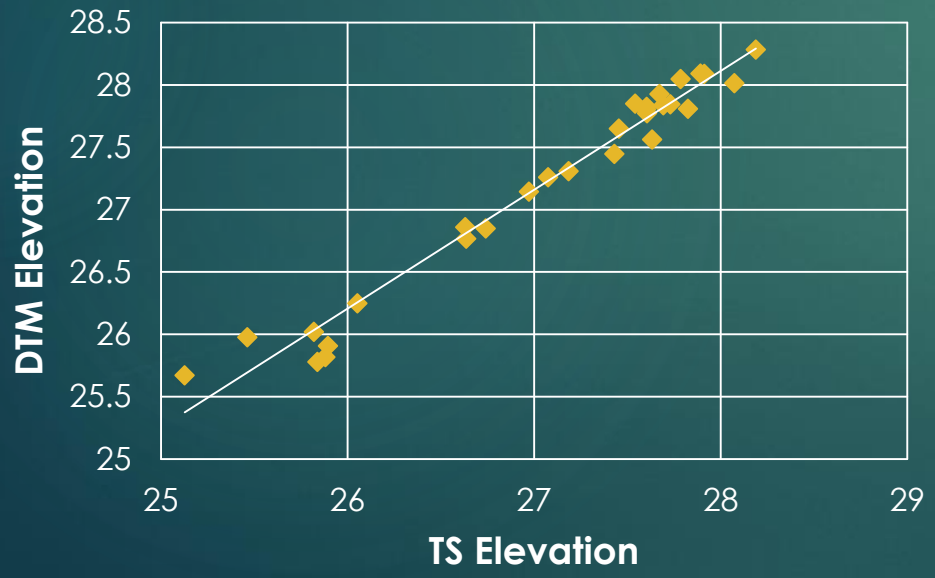
12Hall - TS vs DTM Elevation (Z)



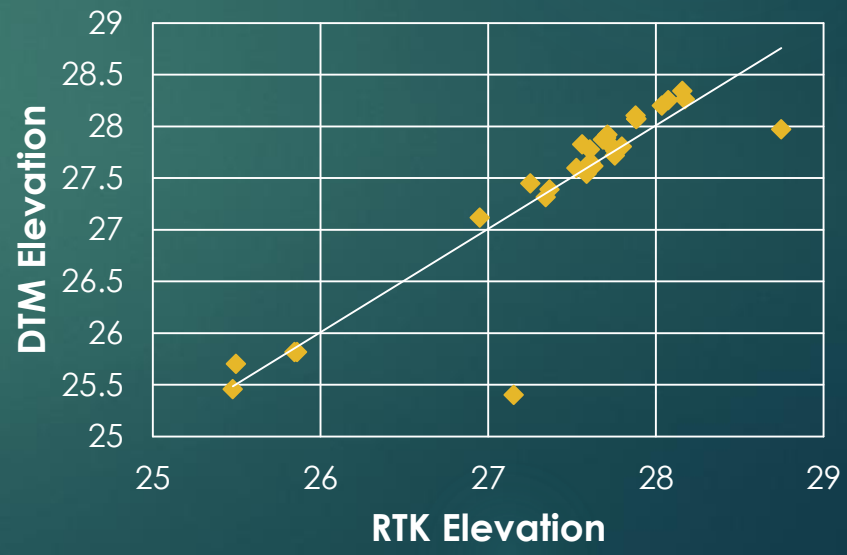
12Hall - RTK vs DTM Elevation (Z)



Vaturara TS vs DTM Elevation



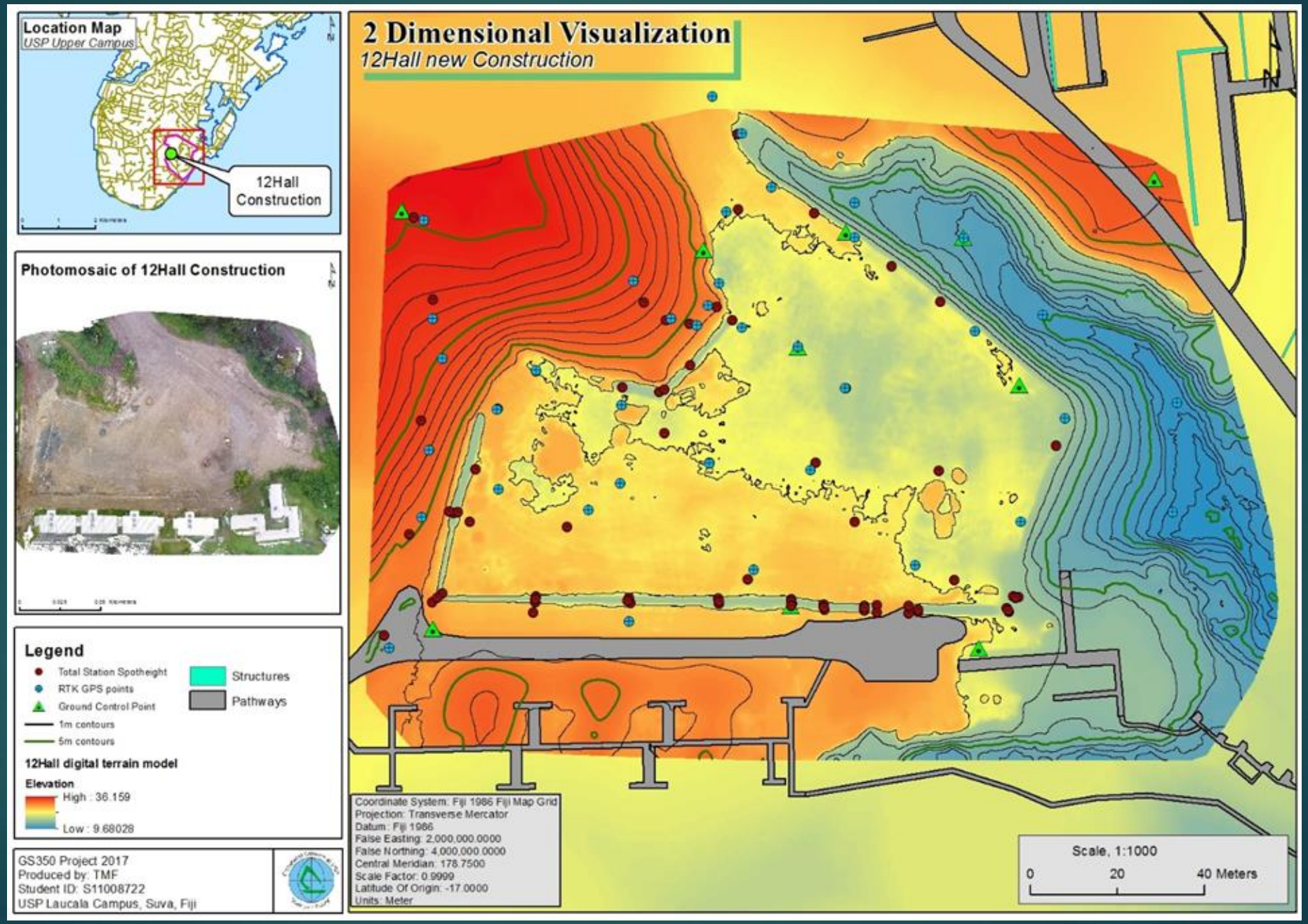
Vaturara RTK vs DTM Elevation



Map Production

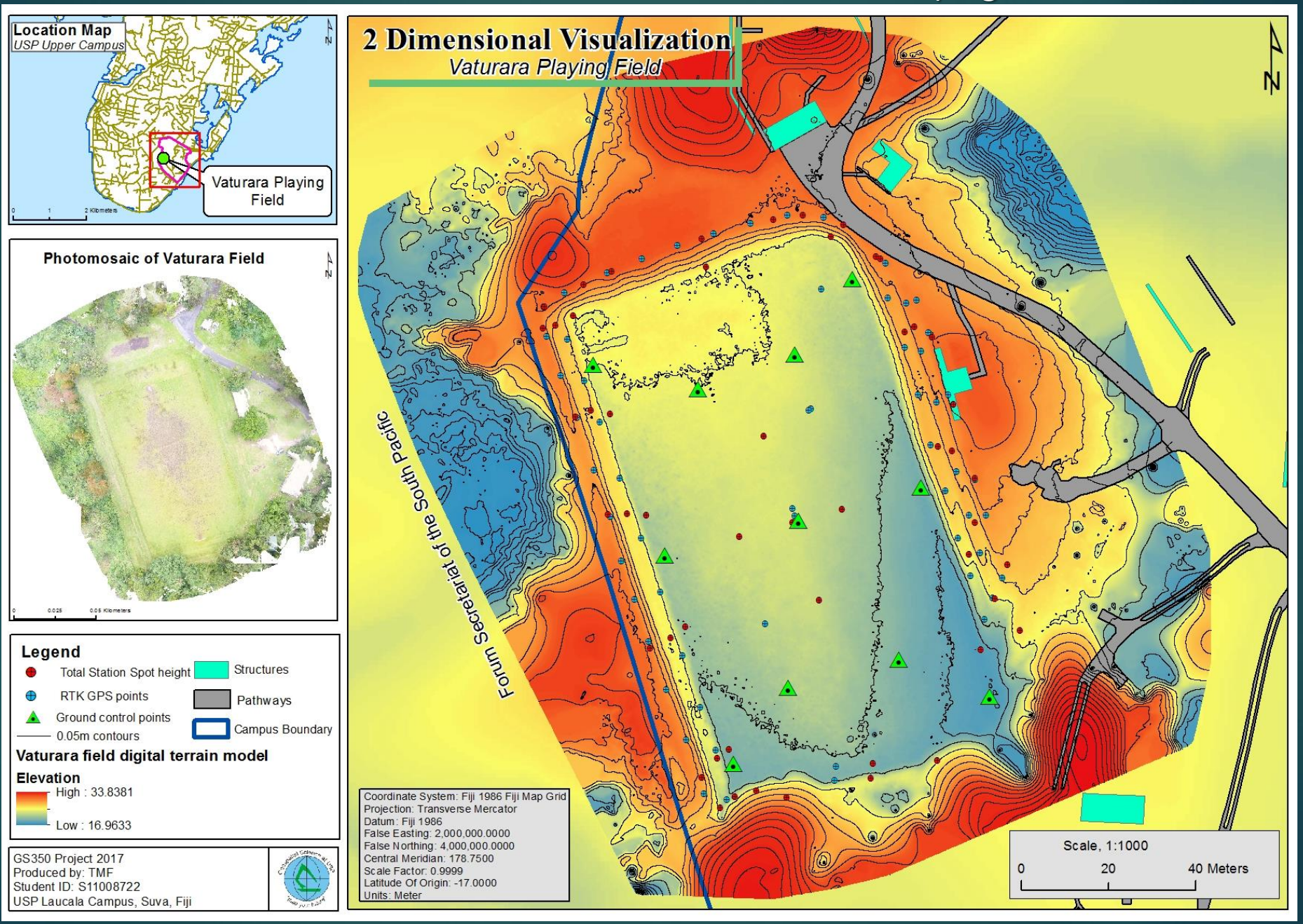
2 Dimensional Visualization of Different type of Landscape

2 Dimensional Visualization – 12 Hall new construction



Note: Putting together Physical points and Images surveyed(RTK GPS, Total Station and Drone) into a Map production

2 Dimensional Visualization – Vaturara Playing Field



Note: Putting together Physical points and Images surveyed(RTK GPS, Total Station and Drone) into a Map production

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Map Production

3 Dimensional Visualization of Difference type of Landscape

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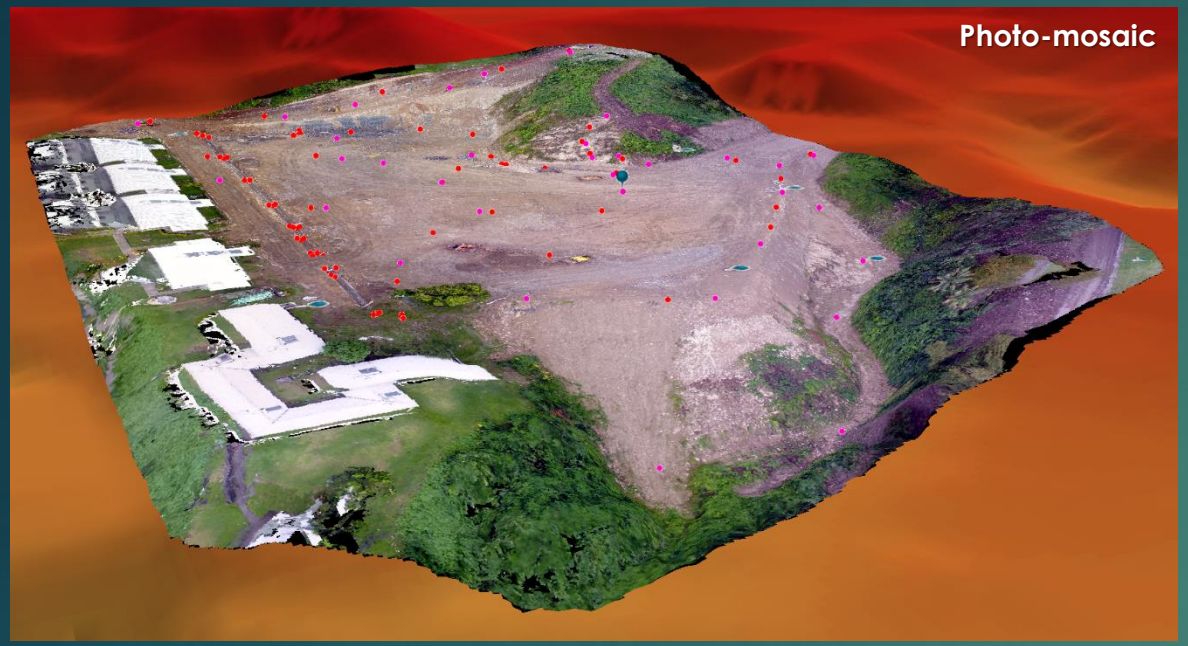
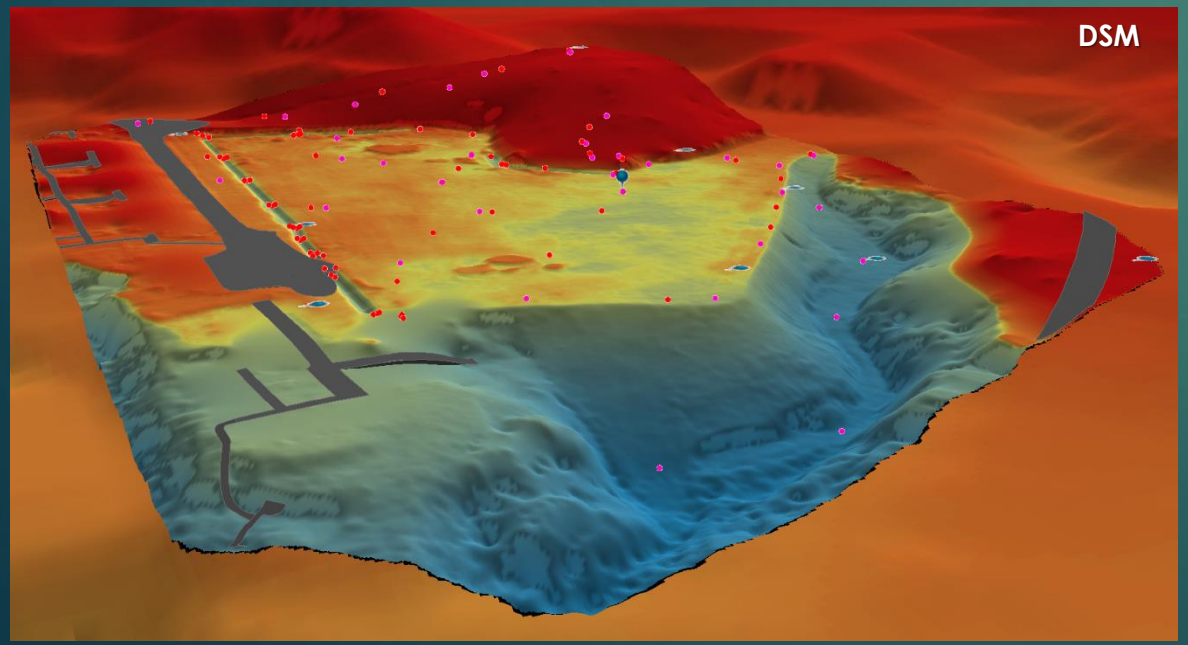
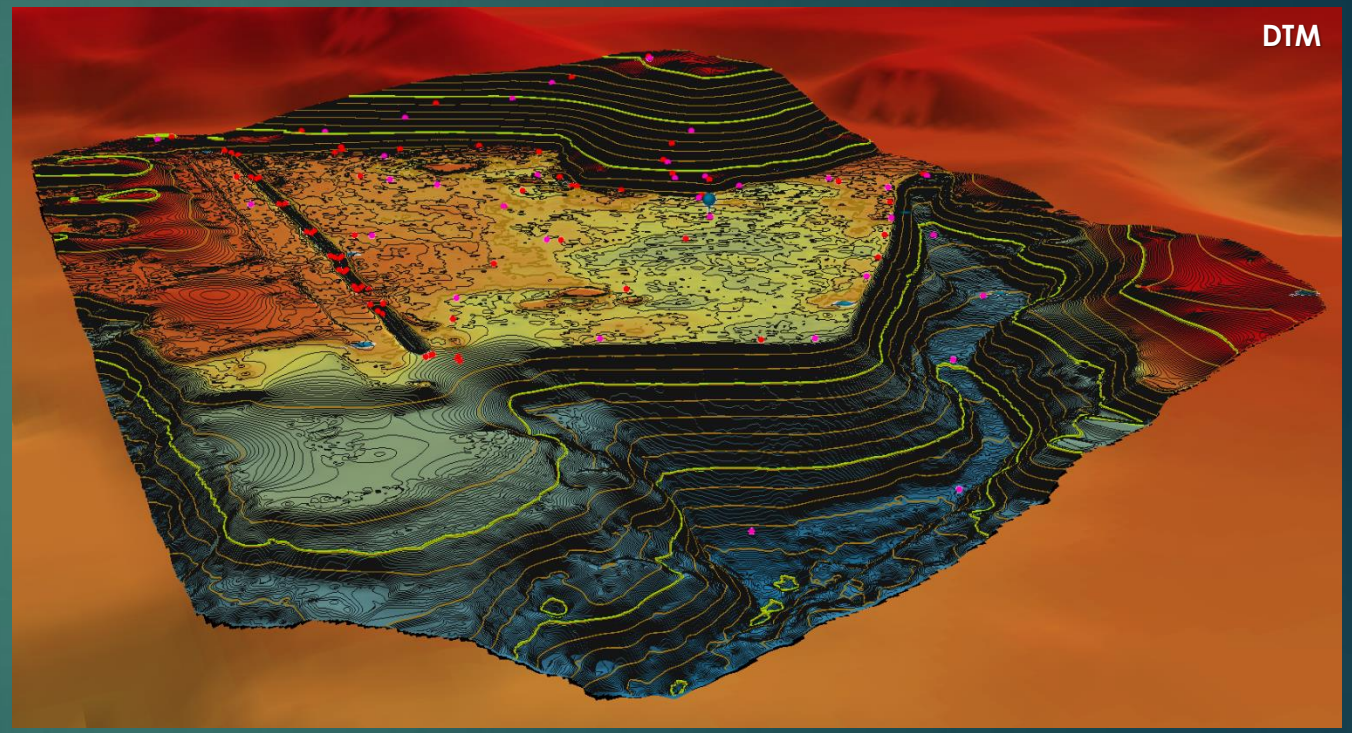
3 Dimensional Visualization
12Hall New Construction







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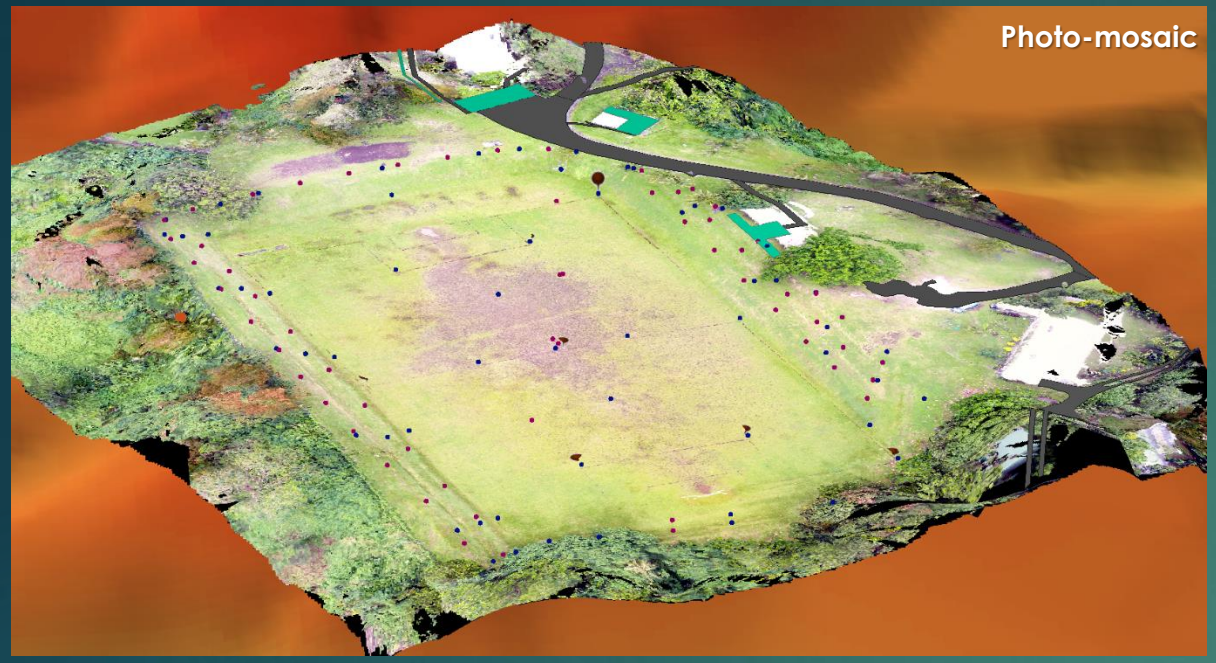
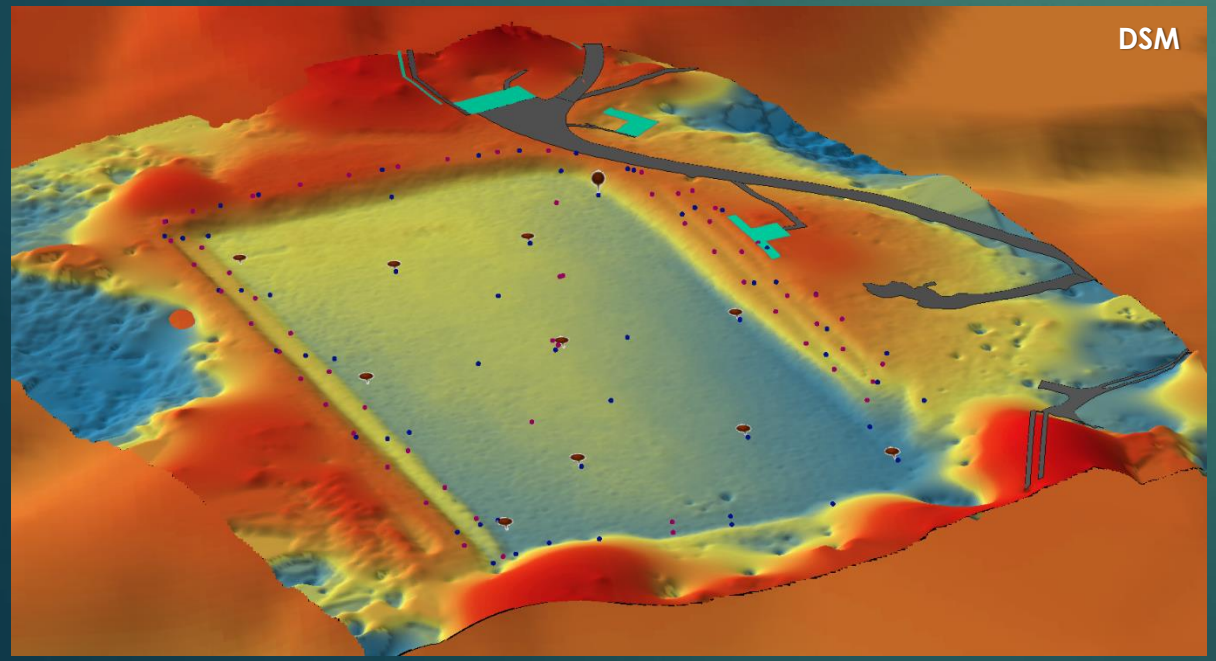
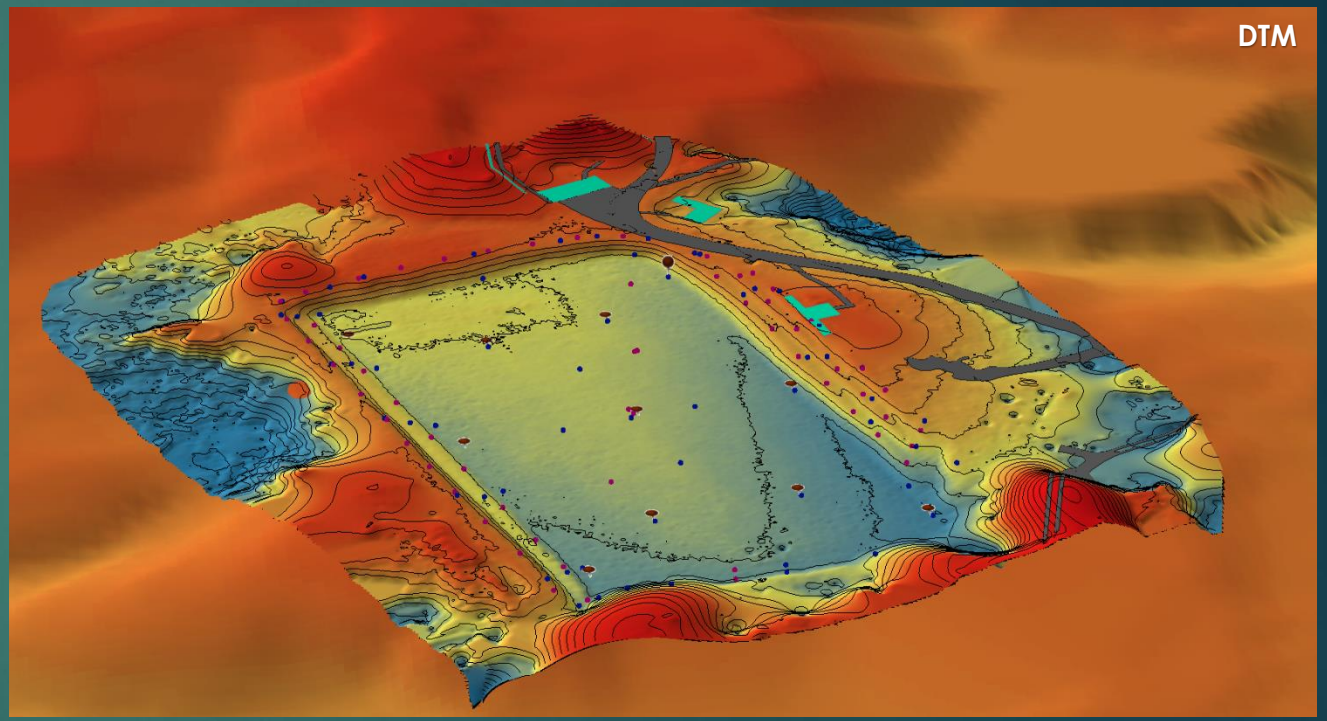
3 Dimensional Visualization
Vaturara Playing field







Conclusion

- ✓ Technical difficulties faced
  - Coordinate system
  - Drone Image processing
- ✓ Yet Objectives and Aims were met
- ✓ High precision equipments (GPS RTK, Total station and Drone), techniques and method of GIS data collection yield high quality data for spatial analysis and mapping
- ✓ Learning a good technical skills

Study of Development At Denarau Island in Fiji Using Satellite Imagery

Siteri Vunisa and Moria Gaunavo

Objectives

- To identify the development range that have occurred from the year 1978(aerial imagery)
- To achieve trend changes that have occurred within the last 37 years; (visual interpretation , ArcGIS online map , story map from ArcGIS online as well) (Using visual Interpretation)
- State the impacts (negative) and benefits (positive) using research methods as well within Denarau that has affected the development range or the lifestyles of people .
- Possible recommendations that are suitable for the area of Nadi Town

Methodology

- Collection of data - aerial imagery from ministry of Lands (aerial imagery of Denarau from 1978 , 1994 , 1984 and 2009)
- Visual Interpretation of developed areas (buildings and boundaries within Denarau) , reclaimed or developed areas that have affected Nadi Town (shape files)
- Classification of digital Images to determine the change in Land features or characteristics.
- Usage of ArcGIS online to display data more informatively where we added layers from file and imported the data or the layers to the map on ArcGIS online

Conclusion

- Some positive benefits includes; employment opportunities, tourism boost in Fiji and potential overseas investments.
- Some negative outcomes of development in Denarau Island includes; increase in flooding in cyclone and rainy seasons, loss of habitats and extinction of marine organisms (biodiversity).
- Because of its location on the delta, Nadi Town needs to be relocated. Also, improvement of drainage and emergency methods for market vendors, shop keepers and other businesses.